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REMARKS

Reconsideration and allowance in view of the foregoing amendments and the following remarks are respectfully requested. Upon entry of this Amendment, newly added claims 8-27 will be pending in the application, claims 1-7 having been cancelled without prejudice or disclaimer. Applicants respectfully submit that the subject matter of new claims 8-27 are fully supported by the original disclosure, and that entry of the new claims would not introduce new matter into the application.

The above-identified U.S. Application is based on PCT International Application No. PCT/GB99/02060 filed on June 30, 1999. When filing the U.S. Application, Applicants had replaced the claims that appear in the PCT International Application (Claims 1-7) with amended Claims 1-10. However, the Examiner confirmed to Applicants' attorney that the April 25, 2002 Office Action was based on Claims 1-7 of the PCT International Application, not on the amended claims that were intended to be entered with the U.S. Application at the time of filing. During a subsequent telephone conference, the Examiner agreed to enter the amended claims and issue a new Office Action based on those claims, but was later overruled by the Supervisory Examiner. In all events, it is respectfully submitted that Applicants' cancellation of claims 1-7 is without prejudice or disclaimer in favor of newly submitted Claims 8-27.

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The Title

In the Office Action, the Examiner suggested a new title because the original title of the invention was not descriptive. Applicants have amended the title, which now includes the phrase “with resistive shunts” as suggested by the Examiner. Accordingly, it is respectfully submitted that the title is now clearly indicative of the invention to which the claims are directed.

Objection To The Specification

In the Office Action, the Examiner objected to the specification because it was all in one section without descriptive headings. In the foregoing amendment to the specification, Applicants have inserted appropriate headings to various sections of the specification so that it now complies with the “content of the specification” format suggested by the MPEP. Accordingly, withdrawal of this objection is respectfully requested.

The word “utilising” on page 1, lines 4 and 20 was changed to “utilizing” as required by the Examiner in paragraph 3 of the Office Action. It is respectfully submitted that both spellings are correct according to THE OXFORD DICTIONARY AND ENGLISH USAGE GUIDE 595 (1996).

In paragraph 5 of the Office Action, the Examiner objected to the specification as failing to provide support that each converter is in the form of an integrated circuit

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mounted on a corresponding one of the resistive shunts as claimed in Claims 5-7 (and in new Claims 15-17). Applicants respectfully submit that the specification fully supports the claims that each converter is in the form of an integrated circuit mounted on a corresponding one of the resistive shunts. The Examiner's attention is directed to page 4, lines 10-11 of the Application where it is clearly stated, with reference to FIG. 1, that "there is a separate signal pre-processing ASIC 15 mounted on each of the shunts 14." Accordingly, withdrawal of this objection is respectfully requested.

Objection To The Drawings

In the Office Action, the Examiner objected to the drawings because Box 17 in FIGS. 1 and 2 requires descriptive legends. Corrected drawings including appropriate descriptive legends ("Processor") for Box 17 in FIGS. 1 and 2 are submitted herewith. Accordingly, it is respectfully requested that the objection to the drawings be withdrawn.

Claim Rejections - 35 U.S.C. § 103

Claims 1-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,701,253 to Mayell ("the Mayell Patent"). The Examiner's claim rejections are rendered moot by the cancellation of claims 1-7. The new claims 8-27 are directed to a device for and method of detecting current imbalance between different lines by use of resistive shunts. In the event that the Examiner believes that this rejection is applicable to any of the new claims, Applicants respectfully traverse the rejection.

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The Mayell Patent is directed to a power meter using an isolated current shunt transducer. However, the Examiner takes a position that the Mayell Patent discloses all the essential elements of the claimed invention, *i.e.*, residual current detection device, even though the Examiner acknowledges that the Mayell Patent does not explicitly disclose detection of any imbalance between the currents flowing through the shunts. In particular, the Examiner states:

Mayell et al. discloses determining difference between voltages and phase angle between voltage and currents, and in order to determine the difference between the phase angle, and phase power between the voltage and current . . . , one skilled in the art must determine the residual current between the two lines, which technically is equivalent to detecting any imbalance between the currents flowing through the shunts.

The April 25, 2002 Office Action, Paragraph 7.

Applicants respectfully submit that the Mayell Patent does not teach or suggest detection of an imbalance between the currents flowing through the resistive shunts. The Mayell Patent is directed solely to a power measurement device. According to the Mayell Patent the difference between the voltage across each current shunt is used to measure the current flowing through each respective shunt. The voltage that is common to the two ends of the current shunts is also measured. *See* Mayell, Col. 2, lines 41-56. The Mayell Patent further discloses different types of power measurements. *See* Mayell, Col. 4, lines 31-49. For example, instantaneous power is defined as the product of the

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magnitude of the voltage on a line and magnitude of the current through the line at any moment in time. Active power may be defined as the product of the root-mean-squared voltage, the root-mean-squared current, and the cosine of the phase angle between the voltage and current waveforms.

However, nowhere in the Mayell Patent is there any teaching or suggestion of a residual current detection device based on detecting the difference between the currents flowing through different lines or that such current difference detection is necessary for measuring any type of power or the phase angle between voltage and current waveforms. The Mayell Patent does not disclose any means for detecting or calculating the current imbalance between different lines connected to a load.

The Examiner also states that the Mayell Patent discloses filtering of the effects of high frequency noise and takes the position that such noise filtering is technically equivalent to decimation filtering. The Mayell Patent discloses the use of a finite-impulse-response (FIR) filter to form a low pass filter that “modifies the streams of digital bits *to remove the effects of high frequency noise*, packages the resulting streams of bits as digital words, and transmits the digital words to processor.” Mayell, Col. 6, line 65 – Col. 7, line 2 (emphasis added). However, decimation filtering (as required by new Claim 14) is not noise filtering. Rather, the purpose of decimation filtering is to reduce a high-frequency one bit data stream into a lower frequency multi-bit data

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stream. Applicants respectfully submit that the FIR filter disclosed in the Mayell Patent is quite different from, and is not technically equivalent to a decimation filter and that the Mayell Patent does not teach or suggest the use of decimation filtering in detecting an imbalance between the currents flowing through the resistive shunts.

The Examiner also takes a position that the Mayell Patent discloses a converter in the form of an integrated circuit mounted on a corresponding one of the resistive shunts. Although the Mayell Patent discloses an analog-to-digital converter in the form of an integrated circuit, it does not disclose the integrated circuits being **mounted** on resistive shunts. The Examiner relied upon FIGS. 2-4; Col. 3, lines 34-37; and Col. 4, lines 50-55 to support his position. However, according to FIG. 2 and Col. 4, lines 50-55 of the Mayell Patent, the multiple integrated circuits for a power meter reside in a single silicon chip (52). FIG. 2 shows that all the analog-to-digital converters (51a, 51b and 56c) reside within a single silicon chip (52) while the current shunts (12a-12c) reside outside the silicon chip (52). Therefore, it is not physically possible for each converter to be mounted on a corresponding one of the shunts in the embodiment shown and described in FIG. 2 and Col. 4, lines 50-55. FIGS. 1, 3 and 4 and Col. 3, lines 34-37 of the Mayell Patent likewise do not disclose that a converter in the form of an integrated circuit is mounted on a corresponding one of the shunts. Thus, it is respectfully submitted that the Mayell Patent does not teach or suggest that a converter in the form of an integrated

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circuit be mounted on the resistive shunt. Rather, the Mayell Patent teaches away from this aspect of the present invention.

New independent Claims 8 and 22 of the present application require detection of an imbalance between the currents flowing through the resistive shunts. As shown in the foregoing remarks, the Mayell Patent does not teach or suggest the detection of an imbalance between the currents flowing through the resistive shunts. Therefore, the Mayell Patent does not teach or suggest all the claim limitations of new Claims 8 and 22, and therefore, does not make out a *prima facie* case of obviousness. MPEP 2143. Furthermore, all other claims dependent from Claim 8 or Claim 22 cannot be obvious over the Mayell Patent, because, among other reasons, the Mayell Patent does not meet all of the claim limitations of Claims 8 and 22. *Id.* For these and the foregoing reasons, withdrawal of the Section 103 rejections over the Mayell Patent is respectfully requested.

CONCLUSION

In light of the foregoing amendments and remarks, it is respectfully submitted that the rejection and objections be withdrawn and that all of the pending claims in the present application be allowed over the cited reference.

Included herewith is a petition for a one month extension of time. A check in the amount of \$110 is also included herewith to cover the fee for a one month extension of

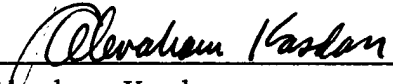
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time for response. No additional fees or extensions of time are believed to be due. However, authorization is given hereby to charge any deficiency, or charge any additional extension of time fees necessary to preserve the pendency of the subject application, to Deposit Account No. 01-1785.

Respectfully submitted,

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Dated: New York, New York
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SCHEDULE A

Redlined Version

IN THE SPECIFICATION

Replace paragraph at page 1, lines 2-3:

This invention relates to a residual current ~~correction~~ detection device for use in a circuit breaker.

Replace paragraph at page 1, lines 4-13 as follows:

Conventionally, residual current is detected ~~utilising~~ utilizing a current transformer having primary windings through which, in the case of a single phase device, load current flows in opposite directions so that if the return current is different from the outwardly flowing current because of current leakage an output current signal is induced in a secondary winding of the transformer. In the case of a multi-phase device, primary windings of the transformer are connected in all of the phase lines and the neutral line. In normal situations, when there is no current leakage, the net current induced in the secondary winding is zero and therefore no output is detected.

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Replace paragraph at page 1, lines 14-21 as follows:

Sophisticated materials have been developed for the core of the current transformer, which enable considerable accuracy to be obtained when the currents flowing in the primary windings are substantially sinusoidal. However, switch mode power supplies are often used for computers and other equipment and there is an increasing tendency for such equipment to cause dc offsets in the currents. Such developments have made detectors ~~utilising~~ utilizing current transformers less reliable and prone to false tripping or failure to detect a dc current leakage.